



School Ecology-Based Education Management for Building Students' Environmental Awareness: A Systematic Literature Review of Strategies and Impacts

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ABSTRACT

This systematic literature review examines the concept, implementation strategies, and impacts of ecology-based education management in schools for building students' environmental awareness. Following a qualitative descriptive-analytical approach, the study critically analyzed 28 peer-reviewed journal articles and scholarly documents published between 2014-2026, accessed through Google Scholar, Garuda, and DOAJ databases. The review employed thematic synthesis to identify patterns across the literature on environmental education, ecopedagogy, and Islamic ecotheology. Findings reveal that effective ecology-based education requires an integrated approach encompassing: (1) transformative school leadership that prioritizes ecological values as institutional identity; (2) contextual, experiential learning that connects students with real environmental problems; (3) consistent school programs such as Adiwiyata that foster sustainable habits; and (4) active participation of school residents and communities. The study further identifies that strengthening moral-spiritual values through Islamic ecotheology provides a more durable foundation for environmental responsibility compared to administrative approaches alone. However, implementation remains constrained by academic-oriented education systems, inconsistent school culture, and limited community support. This review confirms that transforming educational culture is essential for building sustainable ecological awareness, with implications for policy, practice, and future research on integrating ecological values across all dimensions of school management.

Keywords: *Ecology-Based Education Management, Environmental Awareness, Ecopedagogy, Islamic Ecotheology, Sustainable Education*

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INTRODUCTION

The ecological crisis has become one of the most pressing global challenges in recent decades. Environmental problems such as water pollution, waste accumulation, deforestation, climate change, and declining environmental quality continue to occur despite the implementation of various environmental policies, conservation programs, and sustainability campaigns. Reports from the Indonesian Ministry of Environment and Forestry indicate that environmental quality remains under significant pressure due to unsustainable human activities. This condition suggests that environmental issues are not merely related to the physical degradation of nature but also reflect a lack of ecological awareness and responsibility among individuals and communities in maintaining environmental sustainability.

In this context, education plays a strategic role in fostering environmental awareness, attitudes, and behaviors among younger generations. Schools serve not only as institutions for knowledge transmission but also as spaces where values, character, and culture are developed. Through educational processes, students are expected to cultivate ecological responsibility and demonstrate environmentally responsible behavior in their daily lives. Therefore, environmental education should be viewed as an integral component of character formation and sustainable development rather than as an additional educational activity (Purnawanto & Munfariqoh, 2024).

However, the implementation of environmental education in schools continues to face various challenges. Programs such as Adiwiyata, school greening initiatives, waste management campaigns, and environmental awareness activities have been widely implemented, yet their effectiveness in fostering long-term ecological awareness remains questionable. In many cases, environmental programs are conducted primarily to fulfill administrative requirements or achieve institutional recognition rather than to cultivate sustainable environmental values among students. Consequently, students often acquire environmental knowledge at the cognitive level but fail to internalize ecological values into consistent attitudes and behaviors. This situation indicates that environmental education has not been fully integrated into school culture as a system capable of nurturing sustainable ecological consciousness.

These challenges highlight the need for a more comprehensive and systemic approach to environmental education. Environmental awareness cannot be effectively developed through isolated learning materials or occasional environmental activities alone. Instead, ecological values must be integrated into all dimensions of educational management. In this regard, ecology-based education management offers a relevant framework by positioning environmental sustainability as a fundamental principle within the entire school system. Ecology-based education management refers to an educational management approach that integrates ecological values into school leadership, curriculum development, teaching and learning processes, school culture, and the management of educational facilities and resources. This approach aligns with the concept of Education for Sustainable Development (ESD), which emphasizes the integration of sustainability principles throughout educational institutions. Furthermore, it is supported by the principles of ecopedagogy, which promote critical awareness of human–environment relationships, and Islamic ecotheology, which views human beings as *khalifah* (stewards of the Earth) who bear moral and spiritual responsibility for preserving the environment

(Rohman & Syaibani, 2025).

Previous studies have demonstrated the positive contribution of ecology-based education to students' environmental awareness. Siregar et al. (2025) found that the integration of ecopedagogy into educational management encourages the development of students' social and ecological consciousness. Huda and Putra (2026) reported that experiential learning through educational ecotourism effectively improves students' environmental knowledge, attitudes, and behaviors. Similarly, Wachidah and Habibie (2021) emphasized the importance of integrating ecotheological values into Islamic education curricula to strengthen environmentally responsible school cultures. Nevertheless, most existing studies examine environmental education from separate perspectives, focusing primarily on curriculum implementation, classroom instruction, or specific environmental programs. Studies that systematically analyze ecology-based education management as an integrated framework encompassing leadership, school culture, learning processes, stakeholder participation, and Islamic ecotheology remain limited. Moreover, there is a lack of comprehensive synthesis regarding the implementation strategies and impacts of ecology-based education management on students' environmental awareness. This research gap underscores the need for a systematic literature review to provide a more comprehensive understanding of ecology-based education management in schools.

Based on this gap, this systematic literature review addresses the following research questions: (1) How is the concept of ecology-based education management implemented in schools? (2) What implementation strategies are effective in fostering students' environmental awareness? and (3) What impacts do these strategies have on students' ecological awareness and behavior? Accordingly, this study aims to synthesize existing knowledge regarding the concept of ecology-based education management, identify effective implementation strategies, and analyze their impacts on the development of students' environmental awareness and ecological behavior.

A systematic literature review was chosen because it enables researchers to identify, evaluate, and synthesize findings from previous studies in a comprehensive and structured manner. Unlike traditional narrative reviews, a systematic review provides a rigorous approach to identifying research trends, recurring themes, knowledge gaps, and future research directions. Theoretically, this study contributes to the development of ecology-based education management by integrating the perspectives of ecopedagogy and Islamic ecotheology into a unified analytical framework. Practically, the findings are expected to serve as a reference for school leaders, teachers, and policymakers in designing educational strategies that promote sustainable school cultures and strengthen students' environmental awareness.

RESEARCH METHOD

This study employed a Systematic Literature Review (SLR) to identify, evaluate, and synthesize studies related to ecology-based educational management in schools in fostering students' environmental awareness. The literature search was conducted between April and May 2026 using three academic databases: Google Scholar, Garuda, and the Directory of Open Access Journals (DOAJ). The review focused on publications published between 2021 and 2026 to capture recent developments in environmental

education, ecopedagogy, Islamic ecotheology, and ecology-based educational management. The keywords used included ecology-based educational management, environmental education, environmental awareness, ecopedagogy, Islamic ecotheology, green school, and Adiwiyata. The search process employed Boolean operators (AND and OR) to obtain relevant literature. Articles published in 2025–2026 were included because they had been officially published and were fully accessible through the selected databases.

The inclusion criteria were: (1) scholarly journal articles published between 2021 and 2026; (2) studies discussing environmental education, ecopedagogy, Islamic ecotheology, environmental awareness, or ecology-based educational management; (3) articles available in full text; (4) publications written in Indonesian or English; and (5) studies relevant to educational and school contexts. The exclusion criteria included duplicate articles, non-academic publications, opinion papers, conference abstracts without full papers, and studies that did not align with the research focus.

The literature selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review was conducted based on a research protocol developed in accordance with the PRISMA framework to ensure transparency and consistency in the identification, selection, evaluation, and synthesis of the literature. From 78 articles initially identified, a screening process was carried out based on the established criteria, resulting in 25 articles that met the inclusion criteria and were included in the final synthesis. The literature selection process is presented in Table 1.

Data were analyzed using thematic synthesis, involving coding, categorization, theme development, and interpretation of findings. The quality of the selected studies was assessed based on journal credibility, methodological rigor, relevance to the research objectives, and consistency of findings. When conflicting findings were identified, comparative analysis was conducted to determine contextual factors and recurring patterns across studies. This study is limited to articles indexed in Google Scholar, Garuda, and DOAJ, as well as publications written in Indonesian and English.

Table 1. Literature Selection Process Based on PRISMA

No.	Selection Stage	Number of Articles
1.	Articles identified through database searching	78
2.	Duplicate articles removed	70
3.	Full-text articles assessed for eligibility	40
4.	Eligible articles	30
5.	Articles included in the review	27

Source: Researcher's analysis (2026).

RESULTS AND DISCUSSION

Based on the analysis of 27 articles that met the inclusion criteria, it was found that studies on ecology-based educational management have continued to develop both conceptually and practically. The reviewed literature indicates that ecology-based education is no longer understood merely as a standalone environmental program; rather, it is increasingly positioned as an integral component of the educational system, closely connected to school policies, learning processes, organizational culture, and the character

development of students.

This development is reflected in the emergence of three major perspectives used to explain the concept of ecology-based education. Several studies view schools as socio-ecological systems that integrate policies, curriculum, school culture, and learning environments into a unified framework of interrelated elements (Emawati & Nurrahmi, 2021). Other studies emphasize the importance of ecopedagogy, which connects students with environmental issues through contextual and reflective learning experiences (Sawitri et al., 2024). Meanwhile, more recent research demonstrates a growing tendency to adopt the perspective of Islamic ecotheology, which positions humans as *khalifah fil ardh* (stewards of the earth) who are responsible for maintaining environmental balance as part of a religious trust (*Amanah*) (Nurmala et al., 2026).

In addition to conceptual discussions, the literature also identifies various strategies employed by schools to implement ecology-based education. The most frequently reported strategies include strengthening school leadership, integrating environmental values into the curriculum and learning process, implementing environmentally oriented school programs, and fostering collaboration with families and communities. School leadership plays a crucial role in establishing a sustainable ecological vision and culture (Ikhlilullah & Hadi, 2025), while environmental learning is commonly implemented through contextual approaches that connect academic content with ecological realities surrounding students (Arpiani et al., 2025). Programs such as *Adiwiyata*, school greening initiatives, and waste management activities are also among the most widely documented forms of implementation in the literature (Pahleviannur, 2024).

These strategies generally have a positive impact on the development of students' environmental awareness. Most studies report improvements in environmental literacy, stronger pro-environmental attitudes, and the emergence of environmentally responsible habits in daily life (Rahmat & Affandi, 2025). Furthermore, several studies indicate that ecology-based education contributes to the strengthening of students' spiritual dimensions by fostering the understanding that environmental stewardship is part of one's moral and religious responsibility (Indrajaya & Delimanugari, 2026).

Nevertheless, the synthesis reveals that the implementation of ecology-based education continues to face several challenges. A number of studies report that the strong emphasis on academic achievement often results in environmental issues receiving limited priority within school management practices (Fitriani, 2026). Additional challenges arise from consumerist lifestyles, the influence of digital technology, and the insufficient involvement of various stakeholders in supporting the development of students' ecological behavior (Sarjana et al., 2026). Consequently, many studies recommend strengthening Islamic ecotheological values through the integration of the concepts of *khalifah fil ardh*, *amanah*, and *mizan* (balance) into school leadership, curriculum design, learning activities, and organizational culture as a future direction for ecology-based education (Maulana et al., 2025).

Overall, the literature synthesis demonstrates that ecology-based educational management is a multidimensional approach that extends beyond environmental preservation. It encompasses the transformation of educational culture, character development, and the cultivation of students' spiritual awareness. These findings are further analyzed through four major themes: the concept of ecology-based educational

management, implementation strategies, impacts on students' environmental awareness and behavior, and the challenges and future directions of ecology-based educational management.

A. The Concept of School Ecology-Based Education Management

Table 2. Synthesis of Ecological-Based Educational Management Concepts

No.	Perspective	Main Focus	References
1.	Socio-Ecological System	Integration of school policies, school culture, curriculum, and the environment	Dazia (2026); Hardianti et al. (2024)
2.	Ecopedagogy	Contextual learning and ecological experiences	Siregar et al. (2025)
3.	Islamic Ecotheology	Khalifah fil ardh, amanah, and mizan as the foundation of environmental education	Mutiara (2025); Wachidah & Habibie (2021)

The development of environmental problems indicates that environmental education can no longer be understood merely as the delivery of knowledge or the implementation of environmental programs in schools. Despite the widespread implementation of activities such as greening programs, waste management initiatives, and environmental campaigns, ecological problems continue to persist. This condition suggests that the primary issue lies not in the lack of environmental programs, but in the failure to integrate ecological values into educational culture and systems. Therefore, ecological-based educational management has emerged as an approach that positions the environment not as an additional activity, but as an integral part of the entire school management process (Hardianti et al., 2024).

This shift is reflected in the growing perspective that views schools as socio-ecological systems. From this perspective, school policies, curricula, organizational culture, infrastructure, and social interactions are considered interconnected components that collectively shape students' environmental awareness (Dazia, 2026; Emawati & Nurrahmi, 2021). Unlike conventional approaches that focus primarily on environmental content in classrooms, this perspective emphasizes that ecological behavior is formed through students' lived experiences within the school environment as a whole.

Nevertheless, the literature reveals differing views regarding the most influential factors in fostering ecological awareness. Some studies emphasize the importance of contextual learning through ecopedagogical approaches that connect students with real environmental issues and reflective learning experiences (Sawitri et al., 2024). Similarly, Siregar et al. (2025) argue that direct engagement with environmental problems strengthens students' ecological understanding. In contrast, other studies suggest that environmental literacy does not necessarily lead to sustainable behavioral change unless it is supported by a strong school culture and institutional commitment (Ikhlilullah & Saiful Hadi, 2025). These differing findings indicate that ecological awareness cannot be explained solely through pedagogical approaches or environmental programs. Rather, it requires the integration of learning experiences, school culture, and educational management systems.

These limitations help explain why the perspective of Islamic ecotheology has become increasingly relevant in ecological education studies. Unlike approaches that

primarily focus on cognitive and administrative dimensions, Islamic ecotheology places the relationship between humans and the environment within a moral and spiritual framework. Recent studies highlight a growing tendency to interpret environmental responsibility through the concepts of *khalifah fil ardh*, *amanah*, and *mizan*, which position environmental stewardship as an integral part of religious obligations (Nurmala et al., 2026). Consequently, environmental concern is not driven solely by knowledge acquisition or compliance with school regulations, but also by the internalization of values that cultivate a deeper ecological commitment (Mutiara, 2025).

The literature synthesis highlights the significant contribution of ecological-based educational management in connecting managerial, pedagogical, and spiritual dimensions within an integrated framework. This finding extends previous studies that tend to treat environmental education as a separate program or instructional strategy. However, research that explicitly integrates the principles of *khalifah fil ardh*, *amanah*, and *mizan* into school management practices remains relatively limited. This gap suggests the need for developing ecological-based educational management models that position Islamic ecotheology as both a conceptual and operational foundation for fostering a sustainable ecological culture.

B. School Ecology-Based Education Management Implementation Strategy

The literature synthesis indicates that the implementation of ecology-based educational management is generally carried out through four main strategies: school leadership, the integration of environmental values into the curriculum and learning process, environmentally oriented school programs, and the participation of school members and the wider community. Although these strategies are often discussed separately, the findings suggest that the effectiveness of ecology-based education is largely determined by the interconnection among these components. In other words, the success of environmental education depends not merely on the existence of specific programs but on the school's ability to establish a system in which ecological values become an integral part of educational culture.

Among the identified strategies, school leadership appears to be the most influential factor because it shapes the school's vision, policies, and organizational culture. However, the literature reveals differing approaches to ecological leadership. Some schools continue to adopt an administrative approach focused primarily on compliance with environmental programs, while others employ transformational leadership that seeks to cultivate collective awareness among school members regarding environmental sustainability. This contrast suggests that the success of environmental education is influenced more by cultural transformation than by the mere availability of environmental programs (Ikhlilullah & Saiful Hadi, 2025).

In addition to leadership, curriculum and learning processes serve as key instruments for internalizing environmental values. Numerous studies have demonstrated that contextual learning approaches enhance students' understanding of ecological issues by connecting academic content with real-life environmental challenges (Nurlina et al., 2025). Nevertheless, other findings indicate that increased environmental literacy does not necessarily lead to consistent pro-environmental behavior. This divergence highlights an ongoing debate regarding the effectiveness of pedagogical approaches in fostering ecological awareness. While some studies emphasize experiential learning as the primary

determinant of environmental concern, others argue that behavioral change is more strongly influenced by school culture and the broader social environment. These findings suggest that environmental education focused predominantly on cognitive outcomes has limitations in developing long-term ecological responsibility.

A similar issue can be observed in the implementation of environmental school programs such as *Adiwiyata*, waste banks, school greening initiatives, and waste management projects. Although these programs have been shown to increase student participation in environmental activities, their effectiveness is not always consistent across different contexts. Some studies report that environmental programs successfully cultivate lasting ecological habits when supported by a strong and consistent school culture, whereas others find that their impact tends to diminish once supervision or formal evaluation ends (Ghazali, 2025). These contrasting findings indicate that the success of environmental programs depends not only on the activities themselves but also on the extent to which ecological values are internalized within everyday school life. Consequently, environmental programs are unlikely to generate sustainable change when implemented merely as ceremonial activities or administrative requirements.

Furthermore, the literature suggests that the development of ecological awareness cannot be solely attributed to schools. Families and communities play a crucial role because they provide the social environment in which students practice and reinforce the values learned at school. Challenges emerge when the ecological values promoted by schools conflict with the consumerist culture prevalent in everyday life. This situation helps explain why environmentally responsible behaviors often appear only within the supervised school setting and do not always persist beyond formal educational contexts (Syukrillah et al., 2026).

Based on the synthesis of existing studies, it can be understood that implementing ecology-based education is not merely a matter of programs, curriculum, or leadership viewed independently. The central challenge lies in integrating these components into a coherent and sustainable school culture. In this regard, Islamic ecotheology offers a more comprehensive framework through the concepts of *khalifah fil ardh* (stewardship of the earth), *amanah* (trust), and *mizan* (balance), which position environmental responsibility as an essential moral and spiritual identity of human beings. Although many studies have examined environmental education from the perspectives of programs and pedagogy, research integrating school management strategies with Islamic ecotheological principles remains limited. This gap highlights the need for the development of an ecology-based educational management model that aims not only to change behavior but also to foster sustainable ecological consciousness.

C. The Impact of Implementation on Students' Environmental Awareness and Behavior

The implementation of ecology-based educational management generally has a positive impact on improving students' environmental literacy. The integration of ecological issues into the learning process helps students understand the relationship between human activities, environmental degradation, and the sustainability of life. However, the findings also indicate that increased knowledge does not automatically lead to sustainable behavioral change. Therefore, environmental literacy can be regarded as an important foundation, but it is not sufficient on its own to foster deep ecological

responsibility (Hayatul & Affandi, 2025).

This limitation has prompted greater attention to the affective dimension of ecology-based education. Numerous studies demonstrate that students' involvement in environmental activities can cultivate environmental concern and a sense of responsibility toward their surroundings. Direct experiences enable ecological issues to be perceived not merely as abstract concepts but as realities closely connected to students' everyday lives. This suggests that the development of pro-environmental attitudes requires meaningful social experiences rather than the mere transmission of information in classroom settings (Hayunanda et al., 2025).

Nevertheless, the literature reveals ongoing debate regarding the sustainability of students' behavioral change. Some studies report that ecology-based education successfully fosters environmentally friendly habits that persist in daily life. In contrast, other studies find that such behaviors often remain situational, relying heavily on school supervision, institutional regulations, or specific environmental programs. These contrasting findings indicate that the effectiveness of environmental education in promoting sustainable behavior remains a contested issue within ecological education research. Consequently, observable behavioral changes during program implementation do not necessarily reflect the internalization of genuine ecological awareness (Ramadhani et al., 2025).

This debate suggests that the central issue in ecology-based education extends beyond visible behavior to the motivations underlying such behavior. Empirically, many studies continue to focus on measuring short-term changes in knowledge and behavior. In contrast, relatively little attention has been given to understanding why students maintain environmentally responsible behavior over the long term. This gap indicates that the success of ecological education should not be evaluated solely through indicators of compliance with environmental programs, but also through its ability to foster an internal commitment to sustainability values (Dasuki et al., 2025).

In this context, the perspective of Islamic ecotheology offers a deeper explanation. The concepts of *khalifah fil ardh* (vicegerency on earth), *amanah* (trust), and *mizan* (balance) position environmental stewardship as a moral and spiritual responsibility of human beings. This framework suggests that ecological behavior is driven not only by rules or external supervision but also by the internalization of values that cultivate an intrinsic commitment to environmental sustainability. However, empirical evidence examining the relationship between the internalization of ecotheological values and the long-term sustainability of ecological behavior in schools remains limited and therefore warrants further investigation (Indrajaya & Delimanugari, 2026).

Based on the literature synthesis, the impact of ecology-based educational management should not be understood merely as an increase in environmental knowledge or temporary behavioral change. A key contribution of this review is the recognition that the success of ecological education is more appropriately viewed as a process of cultural and moral transformation that integrates cognitive, affective, behavioral, and spiritual dimensions. Therefore, the primary challenge of ecology-based education is not only to produce students who understand environmental issues, but also to cultivate ecological awareness that endures as part of their identity and lifelong responsibility.

D. Challenges and Future Directions of Ecology-Based Educational Management in Schools

Although numerous studies have demonstrated the positive impacts of ecology-based education, its implementation continues to face several structural challenges. Most schools still prioritize academic achievement as the primary indicator of educational success, causing environmental issues to be positioned as supporting programs rather than integral components of institutional orientation. As a result, environmental initiatives are often implemented in a fragmented manner and have not yet been fully integrated into the overall school management system (Saputra, 2026).

These challenges become even more complex when environmental education encounters the social transformations occurring in the digital era. Students live within a culture that promotes rapid consumption, single-use products, and instant lifestyles, all of which frequently contradict the principles of sustainability. This condition indicates that ecological issues are not merely related to environmental management within schools but are also closely connected to broader social cultures that shape students' daily behaviors. Consequently, ecology-based education must respond to wider social changes rather than focusing solely on technical environmental concerns (Sarjana et al., 2026).

On the other hand, the literature reveals ongoing debates regarding the most effective strategies for developing ecology-based education. Some studies emphasize the importance of strengthening environmental programs and instructional innovations as key drivers of success because they enhance students' participation and environmental literacy. However, other studies argue that such achievements are often temporary when they are not supported by a strong school culture and sustained institutional commitment. These contrasting findings suggest that the effectiveness of ecology-based education cannot be explained solely by the existence of environmental programs but also by a school's ability to transform ecological values into an organizational culture embedded in everyday practices (Ikhlilullah & Saiful Hadi, 2025).

In this context, Islamic ecotheology offers a more comprehensive framework for future development by viewing environmental issues not only as educational concerns but also as moral and spiritual responsibilities. The concepts of *khalifah fil ardh* (stewardship of the earth), *amanah* (trust), and *mizan* (balance) position human beings as caretakers of the earth who are responsible for maintaining the sustainability of life. Within this framework, environmental education should not merely aim at short-term behavioral change but should foster the awareness that environmental stewardship is an inherent religious obligation for every individual (Dina et al., 2026).

Although ecotheological perspectives are increasingly employed in Islamic education studies, most existing research remains focused on integrating environmental values into classroom learning and character education. Studies examining how the principles of *khalifah fil ardh*, *amanah*, and *mizan* can be implemented in school leadership, organizational culture, evaluation systems, and educational policymaking are still relatively limited. This condition highlights a significant research gap that needs to be addressed so that ecotheology can move beyond a normative framework and become a practical foundation for educational management (Muflihin, 2026).

Based on the synthesis of the literature, the future development of ecology-based educational management should shift from a program-oriented approach toward a culture-

oriented approach. The main contribution of this review is the finding that ecological transformation cannot be achieved solely through environmental activities or instructional innovations; rather, it requires the integration of ecological values into leadership, curriculum, school culture, and students' social lives. Therefore, the fundamental challenge of ecology-based education is not merely to provide environmental programs but to establish schools as spaces for fostering a sustainable ecological identity.

CONCLUSION

This systematic literature review examined the concept, implementation strategies, and impacts of ecology-based education management in building students' environmental awareness. Through analysis of 25 peer-reviewed articles published between 2014-2026, the review addressed three research questions regarding conceptualization, implementation, and outcomes.

Regarding conceptualization, the review reveals that ecology-based education management is understood not as administrative programs or isolated activities but as comprehensive systemic transformation. Schools function as social-ecological systems where policies, leadership, learning, and culture collectively shape environmental values. A distinctive contribution is the identification of Islamic ecotheology understanding environmental responsibility as moral-spiritual obligation (*khilafah*) which offers a more durable foundation for ecological awareness than purely cognitive or administrative approaches.

Regarding implementation, the review identifies four interconnected strategies: (1) transformative leadership that establishes ecological values as institutional identity; (2) contextual, experiential learning that connects students with real environmental problems; (3) consistent school programs such as Adiwiyata that build sustained habits; and (4) active community participation that supports and reinforces school-based learning. However, implementation remains constrained by academic-oriented education systems, administrative approaches that prioritize compliance over cultural change, and limited community support.

Regarding outcomes, ecology-based education demonstrates positive impacts across knowledge, attitude, and behavior dimensions. However, the review reveals a critical limitation: behaviors often result from supervision rather than internalized values, suggesting that superficial compliance does not indicate deep ecological responsibility formation. The moral-spiritual dimension appears to enhance behavioral consistency by providing intrinsic motivation.

These findings have significant implications. For policy-makers, educational reform must move beyond program-based to culture-based approaches, incorporating ecological values across curriculum, leadership, and assessment frameworks. For school administrators, transformative leadership that builds institutional identity around sustainability is essential. For educators, contextual, experiential learning approaches are more effective than didactic methods. For researchers, longitudinal and comparative studies are needed to understand how ecological awareness develops over time and across contexts.

This review confirms that transforming educational culture is essential for building sustainable ecological awareness. The fundamental challenge is not merely implementing

environmental programs but creating schools where ecological responsibility is lived as institutional identity and moral commitment. Without such transformation, environmental education risks remaining administrative compliance rather than authentic cultural change.

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